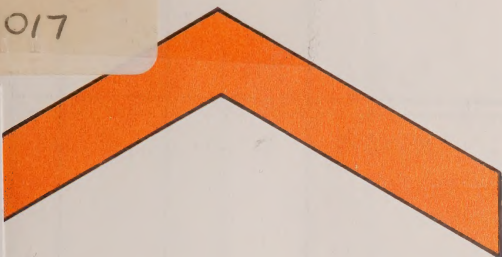
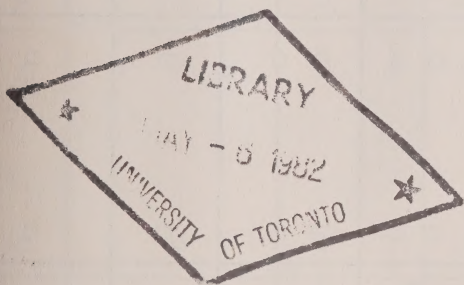


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Buying Your Energy-Efficient New Home



Ministry
of
Energy



Housing & Urban
Development
Association of
Canada

BUYING YOUR ENERGY-EFFICIENT NEW HOME

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New homes in Canada are becoming more energy efficient. This fact is important for those of you who are shopping for a new home because it can save you hundreds of dollars each year, improve your comfort and bring higher resale value.

But all new homes do not conserve energy equally. To make sure your new home will give you the highest energy savings you have to know what to look for and ask for when you shop and buy. This guide tells you how.

Since the introduction of the *Builders' Guide to Energy Efficiency in New Housing* in 1980, many builders across Canada have improved the energy conservation features of their homes. To help you, the buyer, the Ontario Ministry of Energy and the Housing and Urban Development Association of Canada have sponsored the preparation of this guide, which is the buyer's companion to the Builders' Guide.

Read this guide carefully. Then make sure you get the necessary information from builders and salespersons before you buy. You'll be glad you did!

READ THIS AND SAVE MONEY!

If you're buying—or thinking of buying—a newly-built home, this guide's for you! It tells you what features to consider in making your choice so your new home will offer efficient and low cost energy

use. Spend a few minutes reading this guide and following its recommendations as you decide which home to buy; *you'll save money through lower energy bills wherever you live in Canada.*

CONSIDER ENERGY EFFICIENCY IN BUYING A HOME

In examining a new home, you'll be considering many factors. You may not decide to base your purchase decision on energy costs alone, but you should consider energy efficiency carefully. All energy prices have gone up in recent years, much faster than the rate of inflation (see page 5). And future energy costs will be even higher. Your choice of home may make a difference of hundreds of dollars to your total energy costs, and affect the degree of comfort your family will enjoy.

Don't ignore energy costs in making this important purchase decision! *Buying Your Energy-Efficient New Home* provides you with information to help make an intelligent decision. It offers a basic understanding of the main energy-efficient building features and quality aspects that builders should offer in new homes. It explains why these features are important in keeping energy costs down. It tells you what to look for and ask for when visiting model homes and builders' sales offices.

USE THE GUIDE TO FIND OUT HOW

The best way to use this guide is to read through it carefully *before* you visit any homes and sales offices. Then, take it with you and use it as a reference while you shop. It will help you ask the right

questions and look for the important features. An Energy Efficiency Checklist is provided at the end of the guide on which you can record specific features of each home you visit.

CHOOSING AN ENERGY-EFFICIENT HOME

Choosing a new home is complicated. You have to consider important factors such as price, location, number of rooms, finishes, and others. Energy consumption

is also important. Knowing how to take this into account will help improve your ability to afford your new home and be comfortable in it.

THE CHALLENGE YOU FACE AS A NEW HOME BUYER

Shopping for an energy-efficient new house is not easy. All new houses are not equal in terms of energy conservation; and just because a house is new does not mean it's highly energy efficient. *You can't take energy conservation for granted in buying a new home.*

It's true that new homes are built to use less energy than those of a few years ago. Present-day codes and standards require improved insulation levels as compared to those required in the early 70's. And many Canadian builders are informed and concerned about energy efficiency. Canada's national organization of home builders, the Housing and Urban Development Association of Canada (HUDAC), in co-operation with the Ontario Ministry of Energy, has recently published a comprehensive construction guide, *The Builders' Guide to Energy Efficiency in New Housing*. This document has had wide circulation and, together with recent codes, standards and guidelines, is resulting in improved energy efficiency in new homes. HUDAC is sponsoring the Energy Saver Program to

speed up the trend to building more energy efficient housing (see page 29).

However, as energy costs rise, building code requirements for insulation will probably rise also. And there are other energy efficiency features that are worth having, but are not included in the codes. You, the buyer, by insisting on the kind of features that are explained in this buyers' guide, will encourage the building industry to make further improvements. This guide is therefore a shoppers' companion to the *Builders' Guide*.

You should also be aware that many energy efficiency features are either covered up by construction or hard to identify when you visit a new home. You have to know what these features are, where they can be found, and what further information to ask for.

But with some background knowledge, it's possible for you to compare and evaluate different new homes and make an energy-efficient choice. This guide shows you how.

HOW TO SHOP FOR ENERGY EFFICIENCY

As you shop around for your new home, there are two ways to decide which ones are the most energy efficient:

1. Look and ask for energy efficiency features, and
2. Ask for energy cost estimates from builders and sales persons.

Important efficiency features include reduction of unwanted air leaks, adequate levels of insulation, proper size and quality of heating equipment and others. The guide explains these in detail starting on page 7.

Builders or sales persons should be able to provide estimates for heating costs in the home, based on past experience or

on engineering heat loss calculations. Page 25 of the guide explains how to get these estimates and how to use them correctly.

Where possible you should use *both* methods as the basis for making your decision.

* * * *

To sum up:

- Don't take energy efficiency for granted in new homes.
- Read the guide before shopping.
- Look for energy efficiency features before you make your choice.
- Also, try to get energy cost estimates and carefully evaluate them.

UNDERSTANDING ENERGY USE IN A HOME

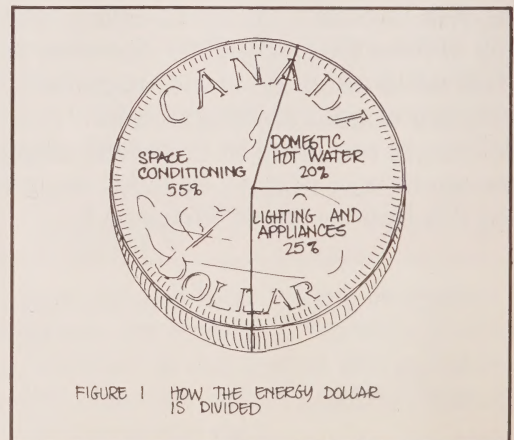
To get the most benefit from this guide you should be aware of how energy is used in a home and the importance of conserving it. You should realize how

heat is lost through various parts of a building, and understand the need for various ways of keeping this loss as small as possible.

ENERGY CONSUMED IN THREE WAYS

Every home consumes energy in three ways. These are:

- **Space Conditioning:** keeping the interior of the home at a comfortable temperature – warm in winter and (if there is air conditioning) cool in summer.
- **Domestic Hot Water Heating:** providing water that's hot enough and in sufficient amounts for bathing, clothes and dishwashing, and other uses.
- **Lighting and Appliance Use:** all lighting, stove, refrigerator, washer, dryer, dishwasher, iron, television, freezer, and other powered devices.



These energy uses are all significant in terms of cost to you as a home owner. Figure 1 shows how yearly energy costs are approximately split for an average new single family house in Ontario. Note that space heating is the largest cost

component, but that hot water and lighting and appliances are also important. You can get significant energy savings in all these categories by your choice of home.

ENERGY CONSERVATION IS IMPORTANT!

Why should you as a home buyer be concerned with energy conservation?

As a new home buyer you must not only consider the purchase price of your home but also its operating costs. Home operating costs are going up fast, and the main reason is the rising price of energy. Many home owners are finding this out the hard way—by making bigger payments to their energy suppliers. The lower operating cost of an energy-conserving home enables you to spend more income on monthly principal and interest payments and less on energy costs. Energy efficiency helps make your home more affordable. *And it also improves its resale value!*

What's even more important is that dollar savings from energy efficiency actually increase over time as energy costs increase. Energy costs have grown significantly in recent years (Figure 2). Just how much these costs will go up in the next few years is hard to say. But one thing is sure: *they'll continue to rise.*

Some energy conservation features push up the price of a home. However, the savings in energy costs they provide can, in

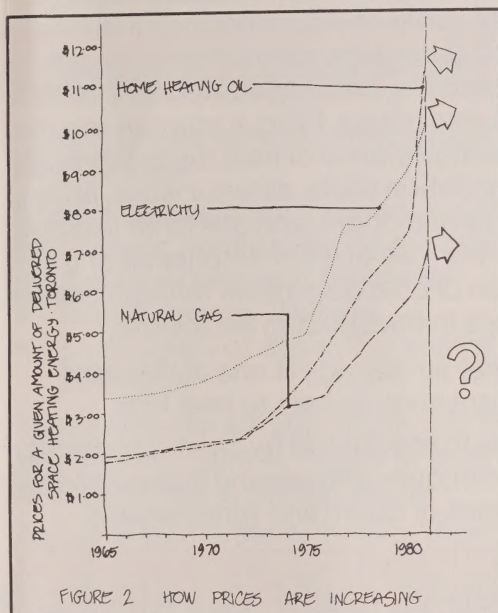


FIGURE 2 HOW PRICES ARE INCREASING

many cases, immediately balance the resulting additional principal and interest payments. Lenders are beginning to understand the long term value of energy efficiency features by allowing the related extra costs to be included in the evaluation of new homes for mortgage purposes.

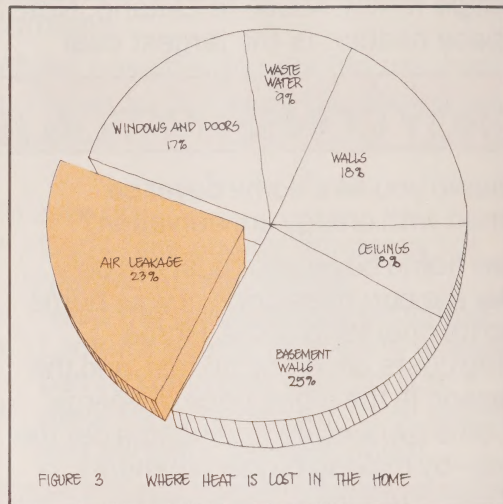
Energy efficiency is clearly a good investment!

HEAT LOSS IN A TYPICAL HOUSE

As indicated above, keeping your home warm generally accounts for the lion's share of your energy bill. These costs come from the need to replace the heat that is continually escaping through the building, no matter how well-built your home may be. Knowing where these costs occur will help you understand the relative importance of some energy efficiency features. Figure 3 shows the proportion of annual heat losses by building component for a typical new house. From it you can see the relative importance of heat losses through the foundation walls, exterior walls, attics, windows and doors, and due to air leakage (that is the loss of warm interior air and infiltration of cold outside air through cracks and gaps in the building enclosure).

Note that air leakage is one of the most important contributors to heat loss.

The way to reduce it is by careful construction techniques and sealing around gaps at the frames of doors and windows and



other places where there are joints in building materials. The guide gives this special attention so that you, the home buyer, can evaluate this aspect of homes that you visit.

SIGNIFICANCE OF AIR EXCHANGE

As building insulation and construction standards improve, homes have less tendency to leak warm inside air to the outside and allow cold air to enter. This results in the need to insure an adequate supply of fresh air for your health and comfort. Fresh air must be exchanged with used humid inside air in an efficient and controlled manner for two extremely important reasons:

1. Stale air contains heat which you pay for, and
2. Used inside air contains humidity

which, if not removed, can condense on cool interior surfaces or within the thickness of the building enclosure, possibly causing mildew and even rotting of building materials!

Your new home should be provided with adequate means of controlled air exchange.

Pay particular attention to the air/vapour barrier (page 10) and caulking and weatherstripping (page 16) which enable air exchange to be controlled.

To sum up:

- Energy consumption in your home is needed for space heating, domestic hot water, lighting and appliances.
- Energy conservation helps make your home comfortable and affordable from day one, and it gives you increasing dollar savings as energy prices continue to go up.

- Air tightness is a desirable quality and depends upon careful design and construction.
- Air exchange becomes very important in a tightly-built home. Controlling air exchange helps provide you with healthy and comfortable surroundings while reducing energy costs and condensation problems. (See page 23).

14 ENERGY EFFICIENCY FEATURES TO LOOK FOR

Whether or not a home has the features discussed below is your main method of measuring energy efficiency. The guide describes 14 of the most important energy efficiency features you should look for. They are all significant. By reading about them here you will become familiar enough with them to be able to compare the energy efficiency of the homes you visit. The 14 features are ones that you can ask the builder or sales person about, or investigate for yourself. Remember, they will help keep your energy bills down!

You may not be able to find new homes with *all* the energy efficiency features

recommended here, but they should have most of them.

Some of the features are more significant than others. For this reason the guide divides them into two categories:

- 8 major energy features
- 6 indicators of additional energy efficiency

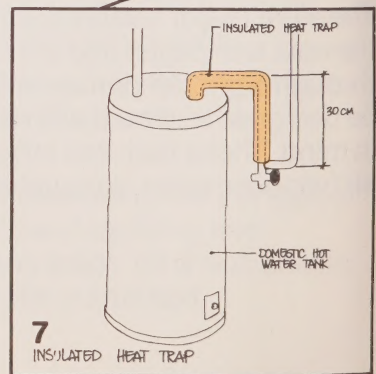
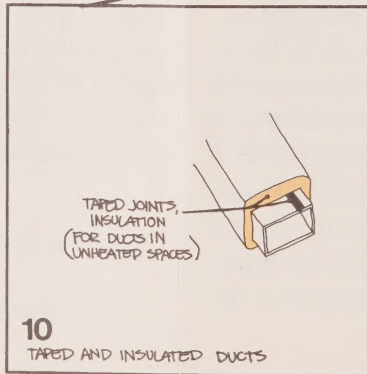
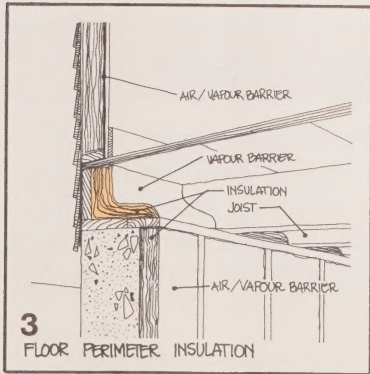
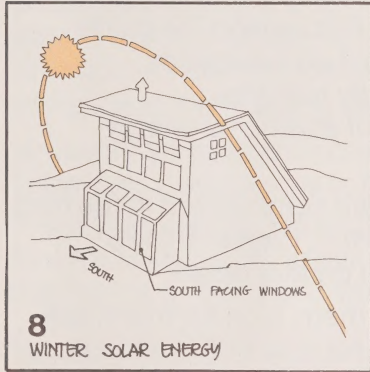
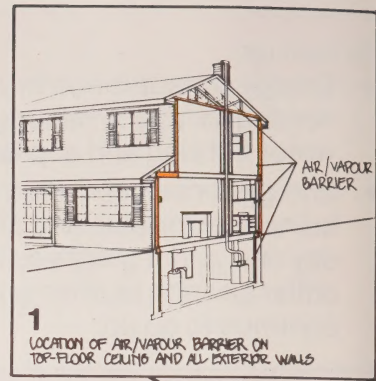
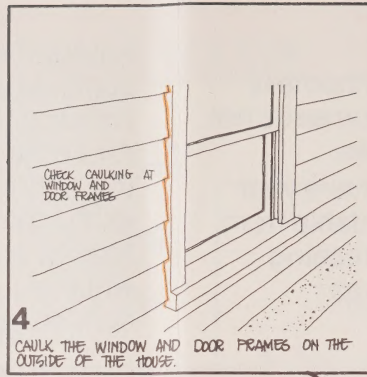
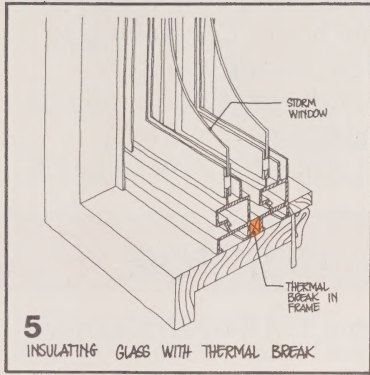
These features are summarized in the next two pages (Figure 4). Pages 10 to 23 describe them in greater detail.

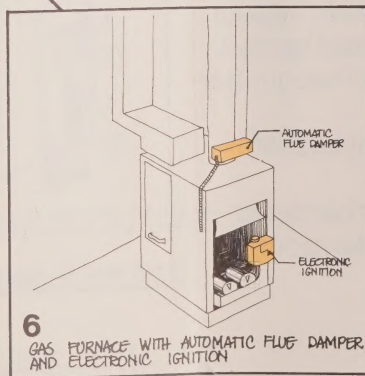
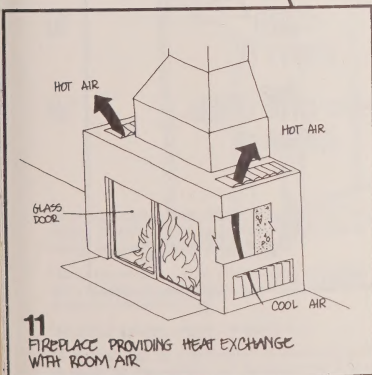
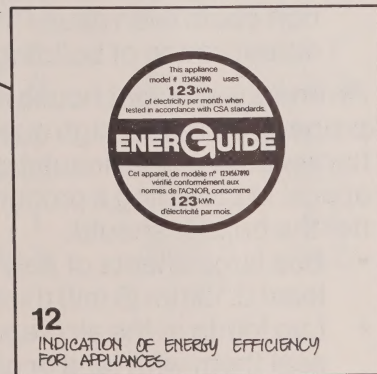
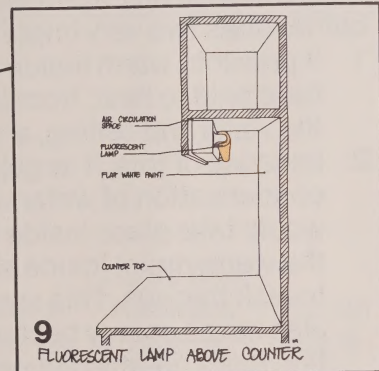
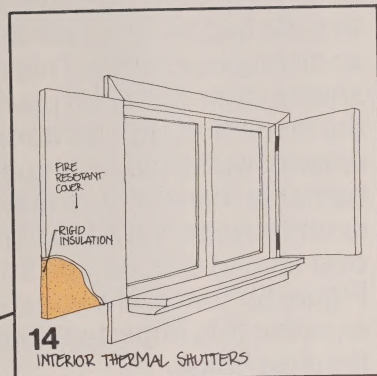
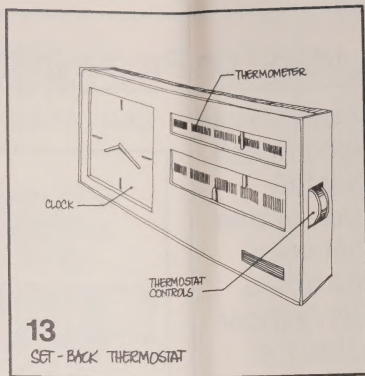
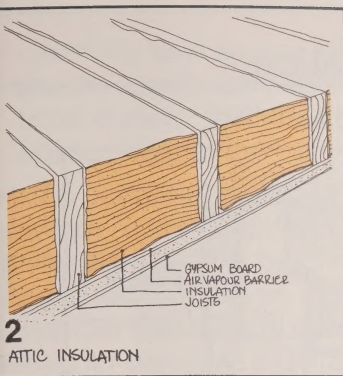
Be familiar with them; look for them; ask for them; and make sure that the home you buy has as many of them as possible!

EIGHT MAJOR ENERGY EFFICIENCY FEATURES

The eight major features are illustrated on the next two pages and are numbered one through eight. All homes in Canada should be designed and built with these features in mind. These features are quality of the air/vapour barrier, adequate insulation

levels, perimeter joist insulation, proper choices of caulking and weatherstripping, storm windows and doors, space heating equipment, domestic hot water equipment, and careful arrangement of the plan layout.





1. Air/Vapour Barrier: Insist on Proper Installation

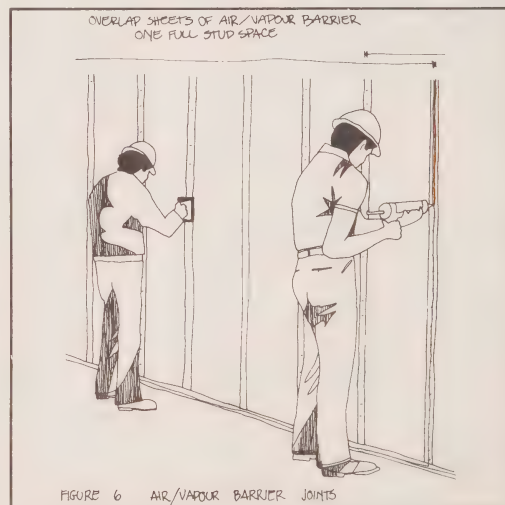
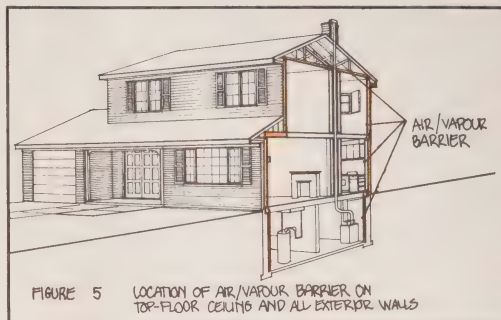
The walls and ceiling of your house should be as air-tight as possible. To accomplish this the builder must carefully install an air/vapour barrier. This is made of thin sheets of air-tight film placed between the insulation and the warm side of the exterior walls and ceiling. The air/vapour barrier is therefore installed inside the exterior walls and basement walls, floors over heated spaces, and attic ceilings (see Figure 5). That's why you can't easily examine this important feature in a finished home.

As mentioned on Page 6 the air/vapour barrier does two very important things:

1. it prevents warm inside air, which you have paid to heat, from leaking through the walls and ceiling, and
2. because of this, it largely eliminates the condensation of water vapour that would take place inside the insulation if the warm moist inside air were allowed to leak through. This second benefit also saves energy because wet insulation has a greatly reduced ability to resist heat loss. Extensive condensation could even cause mildew and deterioration of building materials.

An energy-efficient house must have a properly-installed, high quality air/vapour barrier between all insulation and heated space. In providing a proper air/vapour barrier the builder should:

- Use large sheets of polyethylene at least 0.15mm (6 mil) thick.
- Lap joints in the air/vapour barrier or seal them with tape or caulking compound (Figure 6).



- Carefully seal around all openings in the air/vapour barrier, such as electrical outlets, switches and light fixture boxes (Figure 7).

Ask the builder or his sales person if his home has these qualities. Check to see that the attic access hatch is weather-stripped (and of course, insulated). Remember that a good quality, well-sealed air/vapour barrier is essential. If omitted, it is very difficult to install after construction is completed.

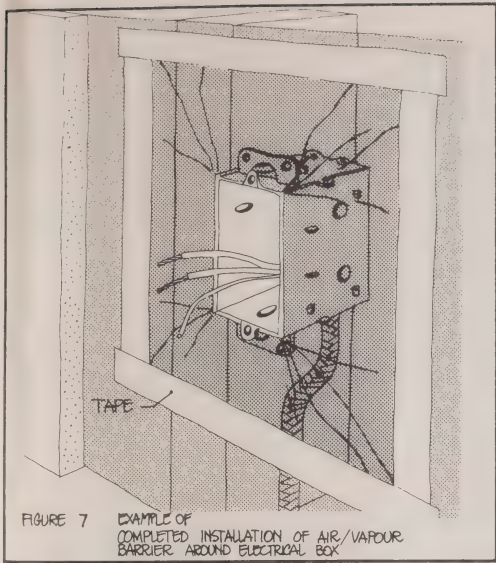


Table 1 (see page 12) Recommended Minimum Levels of Insulation.¹

INSULATION LEVELS FOR TOTAL ASSEMBLY² RSI (R)³

Zone	Maximum Annual Degree Days °C (°F) ⁴	Walls	Floors Over			
			Basement Walls	Roof & Ceilings	Unheated Spaces	Slab-on Grade
I	up to 3500 (6300)	2.5 (14.2)	1.5 (8.5)	4.7 (26.7)	4.7 (26.7)	1.3 (7.4)
II	5000 (9000)	3.0 (17.0)	1.5 (8.5)	5.6 (31.8)	4.7 (26.7)	1.7 (9.7)
III	6500 (11700)	3.4 (19.3)	1.5 (8.5)	6.4 (36.3)	4.7 (26.7)	2.1 (12.0)
IV	8000 and over (14400)	3.7 (21.0)	1.5 (8.5)	7.1 (40.3)	4.7 (26.7)	2.5 (14.2)

¹Forming part of the 1981 Energy Saver Program, sponsored by the Housing and Urban Development Association of Canada. In some provinces, local building code requirements may be higher.

²Total assembly, using an exterior wall as an example, includes the outer air film, cladding, sheathing, framing, insulation, gypsum board interior wall cladding and inner air film.

³Imperial values shown in brackets.

⁴A degree day is a unit used in estimating the fuel requirements of a building; it is equal to the number of degrees that the mean temperature, for a 24 hour day, is below the "base temperature"; which is taken as 18°C (65°F). The total number of degree days indicates the severity of the winter.

2. Get Enough Insulation

Insulation is essential for energy efficiency in cold weather because it slows down the rate of heat loss from the inside of the house to the outside air. Every home must have enough insulation in:

- Walls (Figure 8)
- Ceilings or attics (Figure 9)
- The crawl space, or on basement walls, or around slab-on-grade foundation perimeters (Figure 10)
- Floors over unheated spaces (Figure 11)

How much insulation you need depends upon your climate. Table 1 (see page 11) presents suggested guidelines. These guidelines are based on HUDAC's Energy Saver Program (see page 29).

The guidelines show how much insulation to have, given as "RSI", or "R" values such as RSI 5 or R 26. These figures are measures of insulation value, with RSI or R being the respective metric and imperial equivalents of the same amount of insulation. The higher the RSI or R value, the greater the effectiveness of the insulation.

The Table suggests minimum levels of insulation according to climate zones based on given ranges of annual degree days. Or, look up your community using Table 2, on Page 13 to determine the number of degree days where you live; then determine what levels of insulation your new home should have according to the graph in Figure 12.

These are the suggested requirements that new homes should meet.

Homes built to these standards by HUDAC member builders will be clearly marked as such (see page 29). Of course, some builders may provide higher insulation levels and that's even better. When you talk

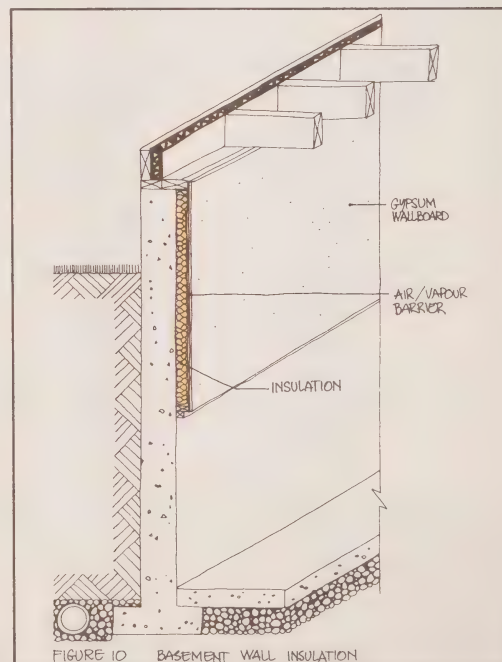
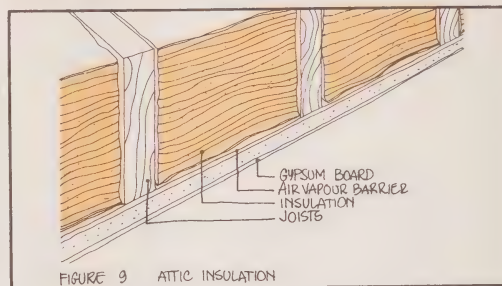
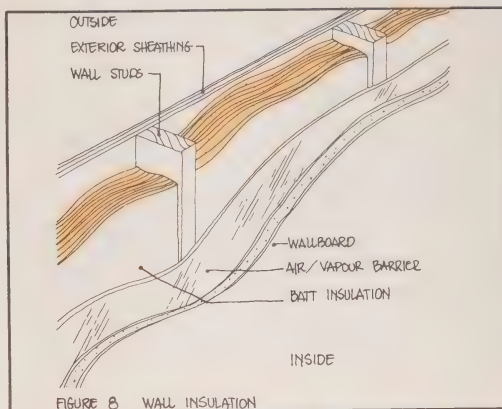


Table 2 Degree days for various locations

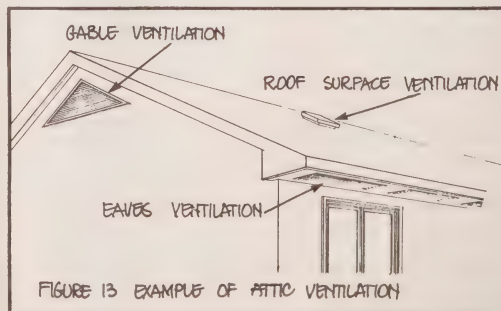
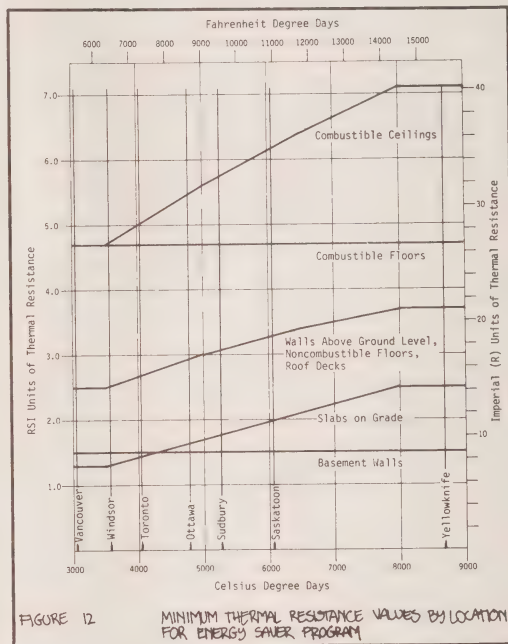
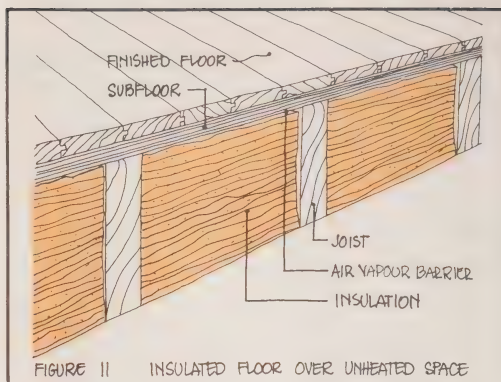
Urban Area	Degree Days Below 18°C	Urban Area	Degree Days Below 18°C
Barrie	4470	Peterborough	4520
Belleville	4190	Port Alberni	3180
Brandon	6037	Portage la Prairie	5890
Brantford	3920	Prince Albert	6562
Brockville	4300	Prince George	5388
Calgary	5345	Prince Rupert	4117
Charlottetown	4623	Quebec City	5080
Chatham (Ont.)	3530	Red Deer	5700
Chicoutimi	5510	Regina	5920
Corner Brook	4900	Rimouski	5400
Cornwall	4470	St. Catharines	3550
Dawson Creek	5890	St. Hyacinthe	4650
Drummondville	4740	Saint John	4771
Edmonton	5589	St. John's	4804
Flin Flon	6780	St. Thomas	3850
Fredericton	4699	Sarnia	3840
Granby	4580	Saskatoon	6077
Guelph	4220	Sault Ste. Marie	5180
Halifax	4123	Sept-Iles	6135
Hamilton	3710	Shawinigan	5110
Jonquiere	5720	Sherbrooke	5242
Kamloops	3756	Sorel	4840
Kelowna	3680	Stratford	4300
Kenora	5932	Sudbury	5447
Kingston	4266	Swift Current	5482
Kirkland Lake	6150	Sydney	4459
Kitchener	4110	Thetford Mines	5350
London	4068	Thunder Bay	5746
Medicine Hat	4874	Timmins	6189
Moncton	4709	Toronto	4082
Montreal	4471	Trail	3650
Moose Jaw	5400	Trois Rivieres	5070
Nanaimo	3010	Truro	4704
Niagara Falls	3740	Val d'Or	6146
North Battleford	6050	Vancouver	3007
North Bay	5318	Vernon	4040
Oshawa	4130	Victoria	3076
Ottawa/Hull	4673	Welland	3640
Owen Sound	4220	Windsor (Ont.)	3590
Penticton	3514	Winnipeg	5889

to the builder or salesperson, specifically ask for the insulation levels in each part of the home: basement walls, floors over unheated spaces, exterior walls, and ceiling. Note the insulation levels, especially whether they are expressed in RSI or R units. Make sure these levels are equal to or greater than the ones recommended here. Don't accept any explanations from builders whose houses provide less than these levels.

You can get an indication of the quality of energy efficiency that the home provides by looking in the attic. Ask the builder or salesperson to let you see this area. Look in through the attic access hatch, bring a flashlight and inspect the whole attic looking for the following features:

- The attic must be ventilated to reduce the possibility of condensation in cold weather. Look for roof ventilation from the outside (Figure 13).
- Blanket type or loose fill insulation should extend evenly out to the edges of the attic, but not extend to cover the eaves beyond the ceiling (Figure 14). It should not block ventilation slots at the eaves (if loose fill insulation is used baffles or other means should be used to prevent it from spreading onto the eaves and covering up the vents).
- Insulation should have no gaps around joints or irregularities (Figure 15). There should be no recessed light fixtures in the ceiling below the attic.
- The builder should provide a tight seal around where ducts come up from the living space and around flues and chimneys.

Remember, adequate insulation is essential! It's very difficult to add in the walls and finished basement after construction is complete.



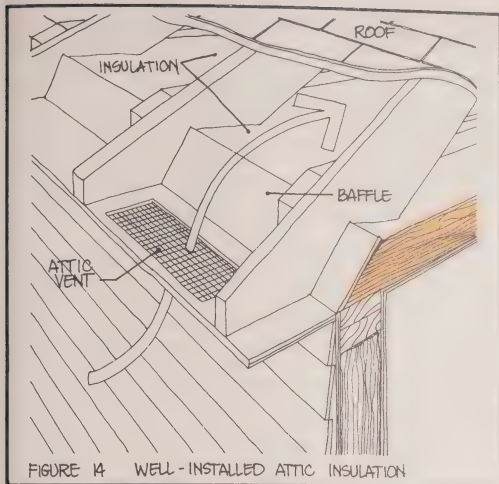


FIGURE 14 WELL-INSTALLED ATTIC INSULATION

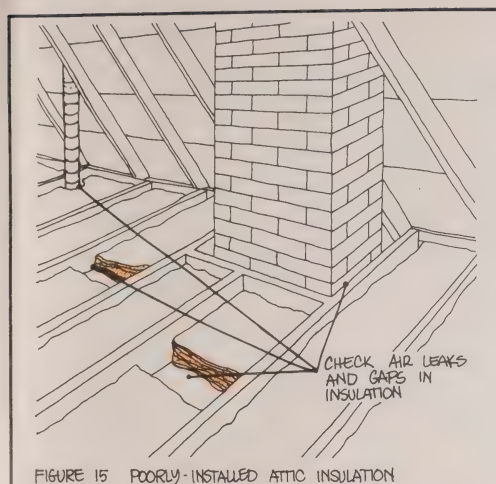


FIGURE 15 POORLY-INSTALLED ATTIC INSULATION

3. Floor Perimeter Insulation Also Helps

The wall at the perimeter of each floor has often been neglected as a place to insulate, due to the extra labour needed to cut and fit insulation. However, it's important to insulate this area; if it isn't insulated, it's like having a missing band of insulation all around the outside walls. Insulation should be installed in the exterior walls immediately below the first floor and if there's a second storey, immediately below the second floor. Only the perimeter insulation for the first floor will be visible (Figure 16), and only if the basement ceiling hasn't yet been finished.

Go to the basement and look for thick insulation carefully cut and installed between each of the floor joists (the long pieces of lumber supporting the floor surface). If the floor has been insulated make sure that the floor insulation has been turned down so as to completely cover the perimeter joists. If the basement ceiling has been finished, ask the builder if the perimeter insulation has been installed.

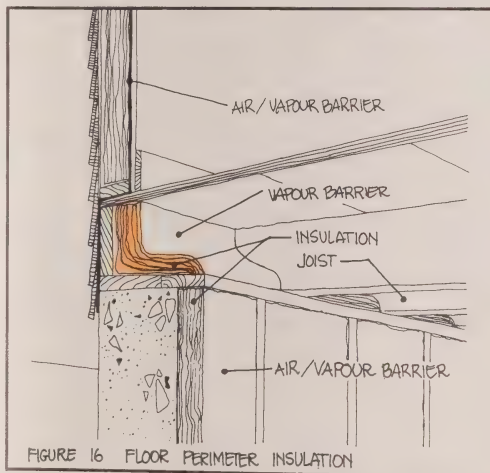


FIGURE 16 FLOOR PERIMETER INSULATION

Also, for a two storey house, ask if the builder has installed this insulation between the first and second stories.

Remember that floor perimeter insulation can only be added if the nearby ceiling surface is either unfinished or partially removed. Therefore this insulation should be installed during construction.

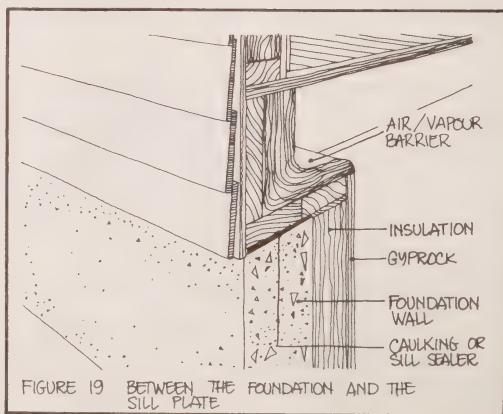
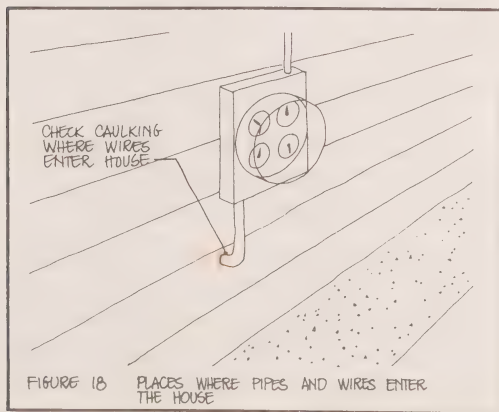
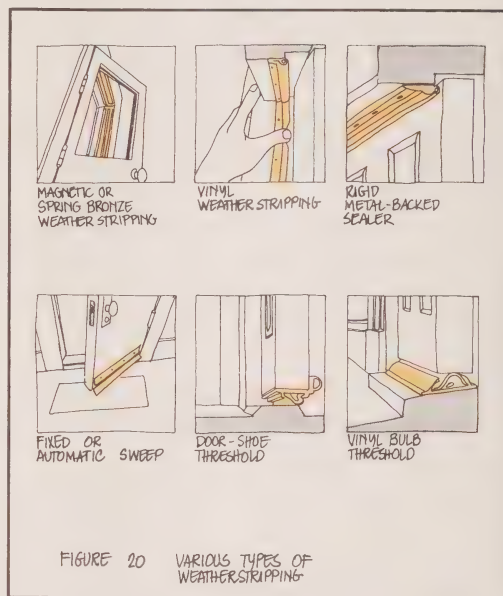
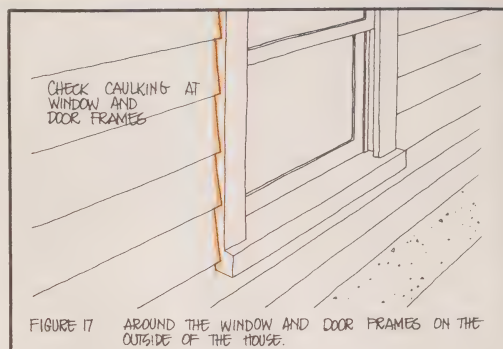
4. Caulking and Weatherstripping for a Tightly Sealed Home

Caulking and weatherstripping provide further air tightness for your home to reduce warm air leakage to the outside. Caulking and weatherstripping are ways to block gaps and openings between building materials. They are essential features of an energy-efficient home.

Caulking is soft putty-like material. The builder should apply it between any two different building materials where there is a possibility of air movement between the inside and outside of the house. It should be applied around chimneys, around window and door frames on the outside, in places where wires or pipes enter the house, and between the foundation and sill plate (Figures 17 to 19).

Weatherstripping can be made of metal, felt, plastic, foam rubber, or vinyl. It's applied around doors, windows and attic access hatches. See some of the more common types of door and window weatherstripping in Figure 20.

Look for caulking and weatherstripping in the homes you visit. Any cracks or gaps in the enclosure separating heated spaces and the outside or unheated spaces (attics, crawl spaces, garages) should be filled.

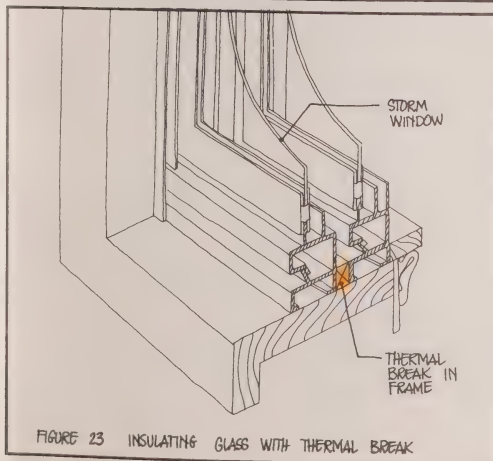
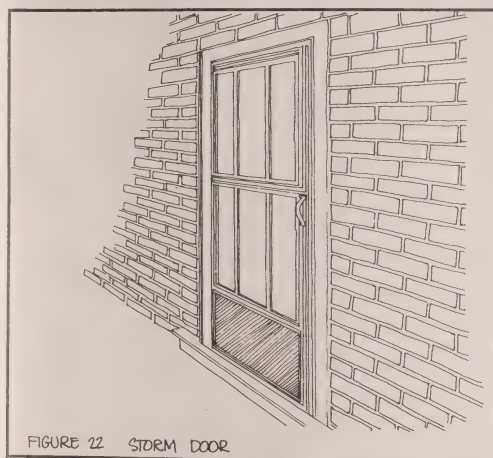
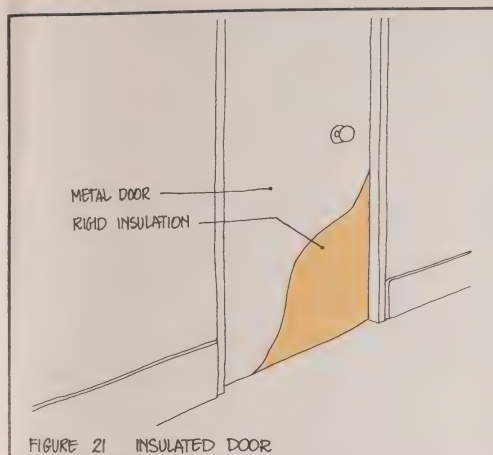


5. Storm Windows and Doors for Further Thermal Protection

In our climate, windows should have at least two layers of glass. Exterior doors should contain insulating material or should have storm doors (Figures 21 and 22). Two layers of window glass can be made up of the regular glass layer and the storm window (Figure 23), or by two layers of glass sealed in a single window frame and separated by a 12mm (1/2 inch) air space. Homes in locations where the number of degree days exceeds 6,500 degree days Celsius (11,700 degree days Fahrenheit), should have windows with three layers of glass. This usually consists of a storm window combined with two layers of glass sealed in a single window frame.

The most energy-efficient windows have either wooden frames (plain or vinyl covered) or have metal frames with a thermal break (an insulating material such as vinyl) between the inner and outer portions of the frame (Figure 23). Avoid homes with sashless (no frame) windows because they allow warm air to leak out easily.

Ask the builder what kind of doors and windows he provides. Then look them over yourself. These features are easy to recognize as you look through the rest of the model home.



6. Check the Selection of Heating Equipment

Your home heating equipment is as important as the outside walls and the ceiling when it comes to energy efficiency. A variety of heating equipment is available.

Gas or electric furnaces should be sized to provide slightly greater than the required heating load. Gas furnaces (Figure 24) should have electronic ignition (to eliminate the need for a pilot light) and a factory-installed automatic flue damper to minimize heat loss when the furnace is not in operation.

Condensing gas furnaces are now becoming available in some parts of Canada. This type of furnace is much more efficient (90-95% compared to 60-65%) than other types of gas furnaces, and can reduce your heating bill by about 1/3, compared to a standard furnace.

When electric baseboard heating is used, look for thermostats in each room, located away from potential drafts. This will allow you to have more flexible control of heat. Baseboard heaters with built-in thermostats should only be used for smaller rooms such as kitchens,

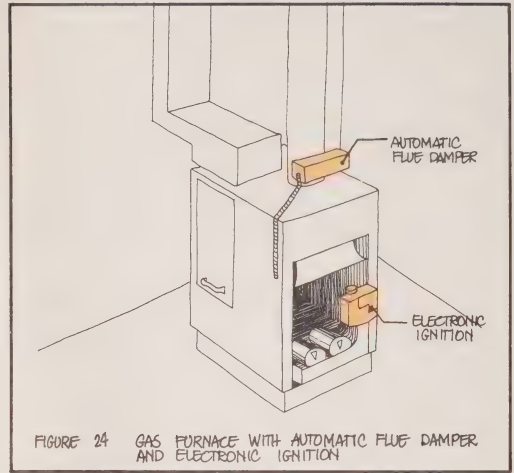


FIGURE 24 GAS FURNACE WITH AUTOMATIC FLUE DAMPER AND ELECTRONIC IGNITION

bathrooms, vestibules, storage rooms and laundry rooms.

If you require cooling in summer, consider an air-to-air heat pump (see page 23).

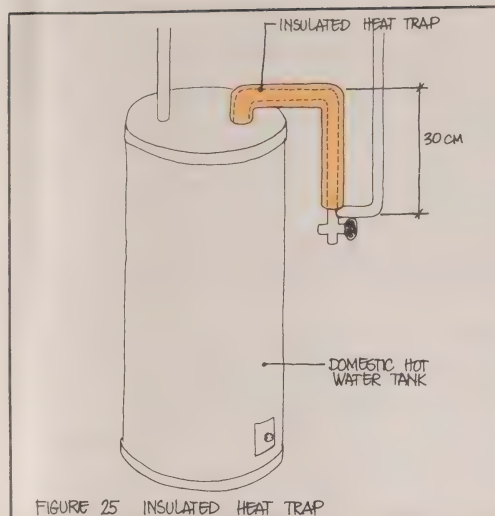
The builder should supply information on operating and maintaining the heating equipment. When you visit homes, ask the builder or salesperson about the space heating equipment and whether it has the appropriate characteristics mentioned above.

7. Proper Hot Water Equipment Saves Energy

Domestic hot water accounts for a significant proportion of the home owner's energy dollar (about 20¢). Ask the builder about the hot water heating equipment. If the home has an electric hot water tank, check to see that it has a Canadian Standards Association performance certification. Ideally, it should have 76mm (3 inches) of insulation built-in.

The hot water tank—whether it is gas or electric—should have an insulated heat trap (Figure 25) to prevent heat loss. Insulation on all hot water piping saves energy. The hot water tank should be located as close as possible to where the hot water will be used in order to reduce pipe length and heat loss.

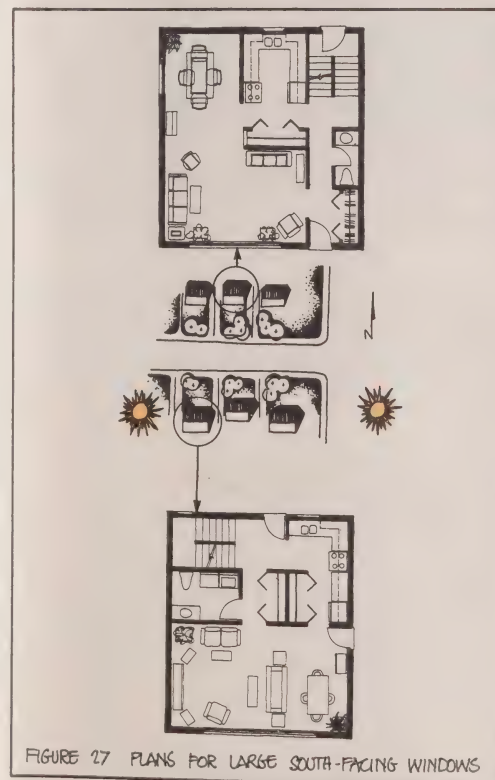
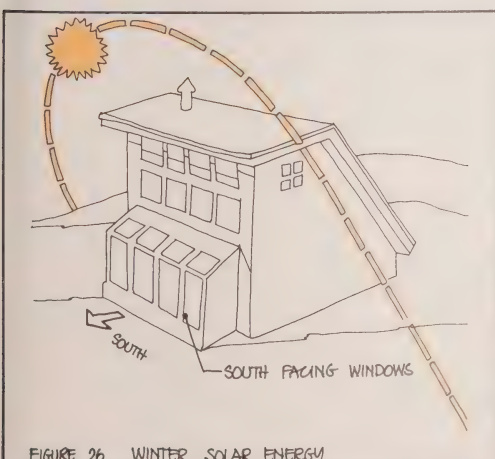
Hot water use in showers can be cut back by use of flow-reducing shower heads. These are inexpensive and can economically reduce hot water heating costs. You can't see this type of device, so ask the builder if he installs them.



8. Look for Floor Plans That Conserve Energy

The way the floor plan of your home is laid out can save energy.

The winter sun can help heat your home, if it can enter through south-facing windows (Figure 26), like a greenhouse. Therefore, the largest windows should face this direction (Figure 27). Consider having insulating curtains to keep interior warmth from escaping through the glass at night. The smallest window areas in an energy-



efficient home will be on the north side. An energy-efficient plan will also have buffers (such as storage rooms or a garage) on the north or northwest walls to protect the home against winter wind penetration.

Energy conscious homes will not have heated spaces over garages or projecting spaces so that the undersides of floors are exposed.

SIX INDICATORS OF ADDITIONAL ENERGY EFFICIENCY

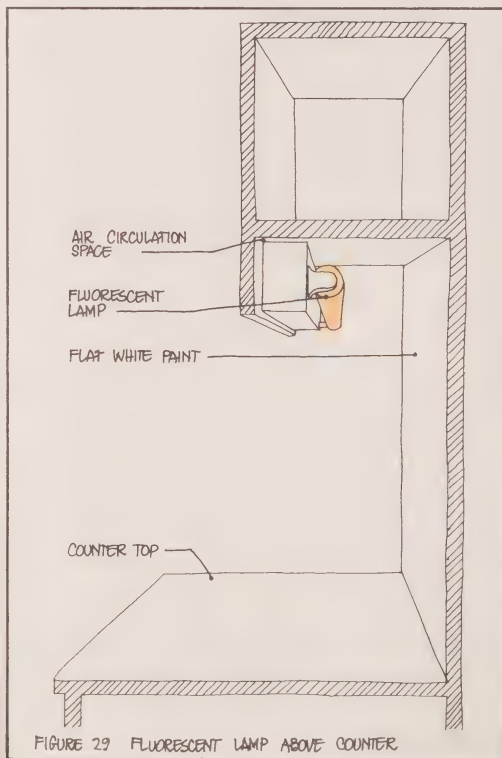
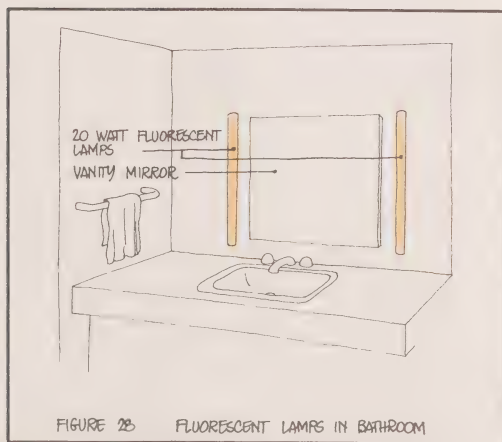
The following six features will also reduce energy consumption in your home. Check to see if the builder included them. This will give you a further indication of the home's overall energy efficiency.

These six features are relatively minor with respect to the overall construction of the home. But they can provide significant energy savings; for this reason, they're generally worth having.

9. Careful Lighting Pays Off

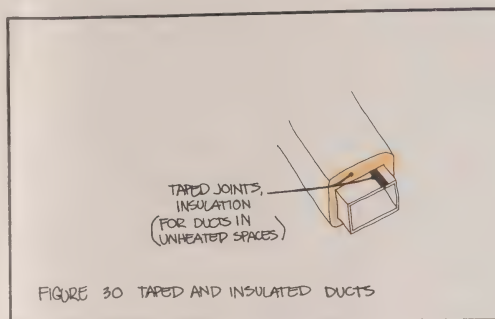
You can reduce electrical energy for lighting by using fluorescent (tubular) lighting. This type of lighting (Figures 28 and 29) uses less electricity for a given amount of brightness than ordinary light bulbs. An energy-efficient home will have fluorescent lights in general task areas such as the kitchen, laundry and bathroom.

Avoid having indirect incandescent lighting because it's an inefficient way to provide illumination.



10. Check for Insulated Ducts

Homes that have forced air heating systems usually use sheet metal ducts to channel the warm air to the various rooms. Ducts should be taped or caulked at all joints for most effective distribution of heat. Ducts, if they pass through unheated spaces, must be insulated (Figure 30). Ask the builder if he'll provide instructions on how to adjust the warm air distribution; this helps to direct heat where you want it instead of heating the whole home all the time.



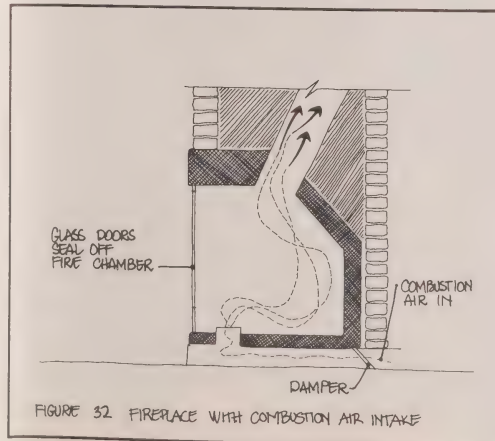
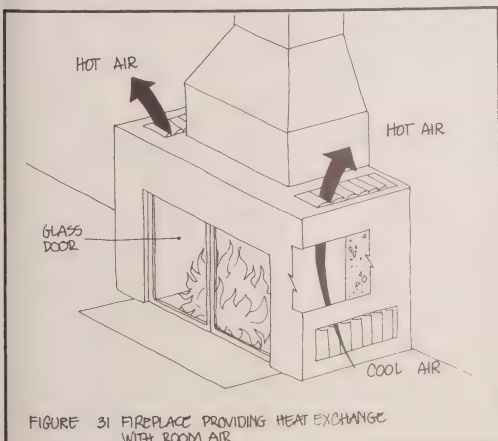
11. Fireplaces Should be Designed For Energy Efficiency

Fireplaces are a popular feature in many new homes. But most fireplaces lose heat by using interior air, which you've paid to heat, to support combustion. The fireplace also loses heat by warm air leaking up the chimney when it isn't being used.

If you want a fireplace, look and ask for the relatively efficient modern ones. Make sure that they have the following features (Figures 31 and 32):

- air tight firebox construction, with glass doors
- dampered air intake from the outside to the firebox
- some form of heat exchanger so that heat from the area near the flames can be transferred to room air.

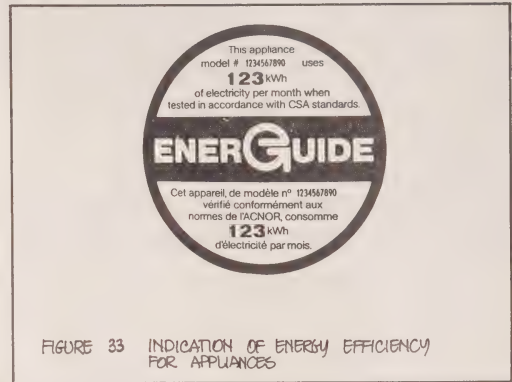
If the fireplace does not have these features your home could lose heat even when the fireplace is being used.



12. Look for Energy-Efficient Appliances

The major home appliances such as the stove, refrigerator, washer, dryer and dishwasher account for an important part of your energy bill. You should realize that similar products made by different manufacturers may vary widely in their energy consumption. Many new homes come equipped with these appliances thereby offering you no choice if you purchase the home. If you purchase a house whose builder does not provide this equipment, you can select and purchase it yourself.

Either way, you should be aware of its energy consumption. The Canadian Government, through the Canadian Standards Association, is testing appliances for energy consumption and attaching labels (Figure 33). These will allow you to compare energy consumption of different brands and models whether they are pro-

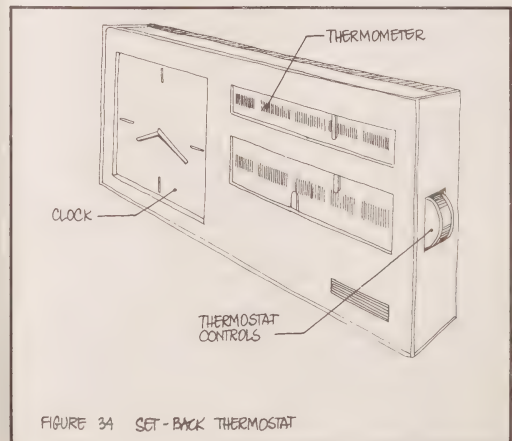


vided by the builder or whether you select them yourself. Your home will have added energy efficiency if the appliances in it have relatively low energy consumption ratings (but be sure to select appliances that are large enough to meet your needs).

13. Consider a Set-Back Thermostat

Set-back thermostats (Figure 34) automatically lower the thermostat setting for one or more periods each day, such as at night, or during the day when the house is empty. This results in less energy being used because the interior temperature is kept lower. The added cost of a set-back thermostat usually pays for itself in a few years by reducing energy costs.

You can get your energy savings more conveniently with a set-back thermostat, than by having manually to adjust the setting on a conventional thermostat. If your new home doesn't come equipped with a set-back thermostat, then consider adding one when you move in.



14. More Features to Save Energy

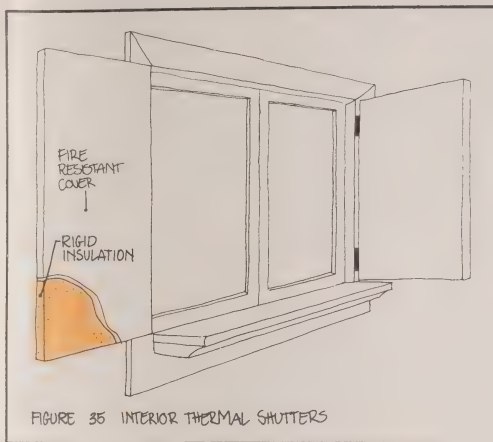
Some relatively new devices have been developed to improve home energy efficiency. These are not commonly found in new homes yet, but can be added later.

Each hour at least one-third of the air in a house has to be exchanged for fresh outdoor air for comfort and health reasons. To reduce the waste of energy already used to heat indoor air, heat can be recovered from it by the use of an **air-to-air heat exchanger**. This device heats incoming cold fresh air by the outgoing warm air. Air-to-air heat exchangers are now becoming more widely available, but they are really only efficient in a tightly sealed home.

Windows, by comparison to walls, are a major source of heat loss, especially at night, because they do not contain any significant insulating material. To offset this, **thermal shutters** for homes (Figure 35) are starting to become available. Thermal shutters consist of panels of insulation that completely cover the window (either on the outside or on the inside) at night and when the room is not being used. Be careful to ensure that the thermal shutters you buy are well sealed at the edges and have a durable opening and closing mechanism. If your new home doesn't have them, bear in mind that they can be added later.

Also consider the use of thermal drapes or blinds.

If you require cooling in summer, consider an **air-to-air heat pump**. It extracts heat from the outdoors and moves it indoors, even though the outdoor air is colder than the indoor air. In the summer, the cycle can be reversed to provide cooling, like an air conditioner.



The heat pump, despite its higher initial cost, is more economical than a conventional furnace if you require your home to be cooled in summer. If a heat pump is provided check to see that it has been put in place by a contractor skilled in heat pump installation and ask for CSA installation Form A. Before deciding to purchase a home with a heat pump, satisfy yourself that skilled servicemen are available in the area for maintenance. You should also check the stated efficiency of the heat pump. This is given as the Coefficient of Performance (COP). The COP should be greater than 1.0 at -12°C (about $+10^{\circ}\text{F}$) in locations with 5,000 degree days C (9,000 degree days F) or less. The COP should be greater than 1.0 at -23°C (about -9°F) in locations with more than 5,000 degree days C (9,000 degree days F). See Table 2 (page 13) for the number of degree days C in your area.

CHECK THE 14 FEATURES WHEN YOU VISIT A HOME

Now that you know about the 14 features highlighted here, you can evaluate homes for their energy efficiency. It's easy to check for these features. You can check yourself for the following 10 features, although it's a good idea to get some supplementary information from the builder or sales person. These features are:

- Insulation Installed Around Floor Perimeters. (Feature 3, page 15)
- Caulking and Weatherstripping. (Feature 4, page 16)
- Storm Windows and Doors. (Feature 5, page 17)
- Plan Layout. (Feature 8, page 19)
- Lighting. (Feature 9, page 20)
- Duct Insulation. (Feature 10, page 21)
- Energy-Efficient Fireplace. (Feature 11, page 21)
- Energy-Efficient Appliances. (Feature 12, page 22)
- Set-Back Thermostats. (Feature 13, page 22)
- Air-to-air heat exchanger, thermal shutters, heat pump. (Feature 14, page 23)

The other four features are difficult to assess, so you'll have to ask about them.

These features are:

- Air/Vapour Barrier Quality and Installation. (Feature 1, page 10)
- Adequate Insulation Levels (you should inspect the attic). (Feature 2, page 12)
- Selection of Space Heating Equipment. (Feature 6, page 18)
- Domestic Hot Water Equipment. (Feature 7, page 18)

A knowledgeable salesperson will be happy to answer questions on the above features, and any others that the home has.

Don't hesitate to ask all the questions you want about energy efficiency in the home. If the salesperson can't or won't answer them, it is a sign that she or he (and perhaps the builder) is not knowledgeable or concerned enough to market an energy efficient home.

It's a good idea to take notes to help remember the features of the homes that you look at. The Energy Efficiency Checklist (pages 30 and 31) helps you to do just that. To use the checklist bring it with you when you visit each home. Check off the features that each home does or does not have. There is space to compare four different homes.

ENERGY COST ESTIMATES BY BUILDERS

This is your second approach to evaluating efficiency. So far the guide has focused on 14 features as one way to estimate energy efficiency of new homes. Now the guide

explains a second approach—looking at energy cost estimates provided by builders.

PAST ENERGY COST INFORMATION

Many builders will be able—if their house models have been occupied for one or more heating seasons—to give you reports on energy consumption and costs. If they are concerned about energy efficiency they will understand your interest and be happy to provide you with this information if it is available. Or, they may have calculated estimates of energy needed for heating.

Remember that information like this must be interpreted carefully. There are two factors in particular to consider:

1. The past utility records should be for a home of size and type similar to the model for sale.
2. The past utility records should be for a home that uses the same fuel for space heating and domestic hot water as the model for sale.

Bear in mind that energy consumption and costs for different families can vary by as much as 50 percent, depending on such factors as the size of the family, age of its members, living habits, and numbers and kinds of appliances. Remember when comparing cost information to make sure it comes from the same time period; energy costs have been escalating so quickly that costs from time periods greater than one year apart are not comparable.

If energy consumption and cost estimates seem unusually low, look to see if the energy efficiency features are particularly good or extensive. If not, then don't place too much importance on these estimates.

WRITE IT DOWN

As for energy efficiency features, use the checklist to record any energy consumption or cost estimates for the homes you visit. At the bottom of the checklist you'll

find spaces to write down information that the builders and salespersons will give you.

MAKING YOUR DECISION

You have many factors besides energy efficiency to consider when buying a home. The decision will be complicated; you may decide not to choose the most energy-efficient home. However, it's important to be aware of energy in your decision.

The 14 energy efficiency features highlighted here, along with energy cost predictions you can obtain from builders and salespersons, will help you make an intelligent decision. Other things being equal (such as location, style, number of rooms, etc.), you should choose the home that has the largest number of energy efficiency features along with the lowest predicted energy bills. Here are some additional things to consider:

1. After you've filled out the energy efficiency checklist, add up the number of "yes" items that you have checked for each home. The total number of "yes items" is a measure of energy efficiency for each home.
2. Remember that some features are more important than others. The first eight features are the most important. In particular proper air/vapour barrier, insulation levels, floor perimeter insulation, caulking, weatherstripping and heating system are critical for high energy efficiency. The other three features of this group are only slightly less important. Features nine to fourteen are less important. Therefore, count the first eight

features heavily in your decision.

3. If you have energy consumption or cost predictions, compare these for different homes. Check if both the energy cost estimates and the number of "yes" items of different homes both show that the same home is most economical. If the results show that the home with the most "yeses" does not have the lowest estimate of energy consumption, find out why. Possible reasons include the following:
 - The design or size of each home may be different.
 - One home may have a higher level of energy efficiency features or more of them than you have noticed.
 - The basis for energy calculations for the different homes may not be the same.

Even if you don't get clear answers for the differences, the added investigation will give you a better understanding of what the features are.

Remember to make your decision based on as much information as you can get. Consider the number of energy efficiency features as part of your overall home buying decision. Energy estimates can supplement this information. By doing this, you'll have systematically included energy efficiency in your decision.

SOME EXAMPLES OF ENERGY SAVINGS

This Guide has outlined a number of features that will save energy consumption and costs in operating a home. You may find it helpful to get a better idea of what kind of savings are possible. To illustrate such savings the Guide provides examples of four common sizes of homes with two different kinds of energy conservation features for comparison purposes. The "Base Case" features include energy standards common to the 1978 Ontario Building Code. For comparison, the "Improved Case" has:

- Tighter construction to reduce the air change requirements;
- Insulation standards according to suggested levels for Zones I, II, and III (see Page 11);
- Use of a spark ignition gas furnace with automatic flue damper (for details see Page 18).

These features are applied to four conventional housing types (see Figures 36, 37, 38, 39): a three bedroom bungalow of 99 sq. m. (1,065 sq. ft.); a four bedroom two-storey house of 172 sq. m. (1,850 sq. ft.); a three bedroom semi-detached home of 119 sq.

m. (1,280 sq. ft.); and a three bedroom row house, also called a townhouse, of 101 sq. m. (1,090 sq. ft.).

Heat loss, fuel requirements and local fuel costs were calculated for the Ontario locations of St. Catharines, Toronto, and Thunder Bay. Table 3 shows the resulting annual savings in energy costs as compared to the base case house.

Remember that these savings are due first of all to:

- higher insulation levels for basement walls, exterior walls and ceilings;
- greater air tightness;
- a more efficient gas furnace with spark ignition and automatic flue damper.

Additional features could be provided to increase these savings. Also, these are based on 1980 energy costs; as energy costs increase, these savings will also increase.

These savings plus added comfort and higher resale value are good reasons for making sure you consider energy in your home-buying decision.

Table 3
Yearly savings in energy costs¹ for upgraded home construction, by location

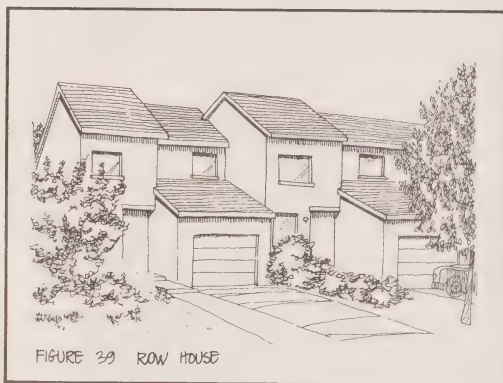
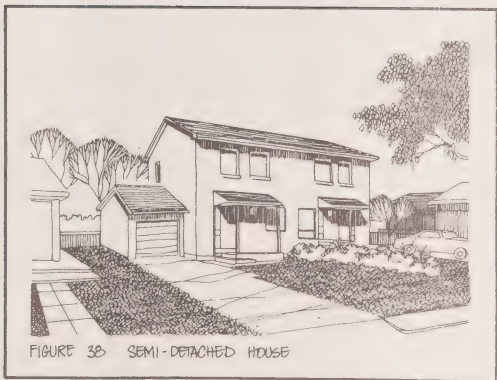
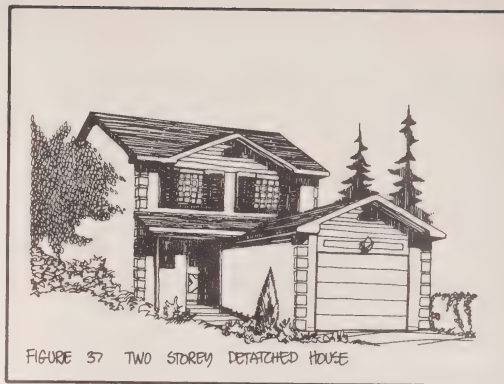
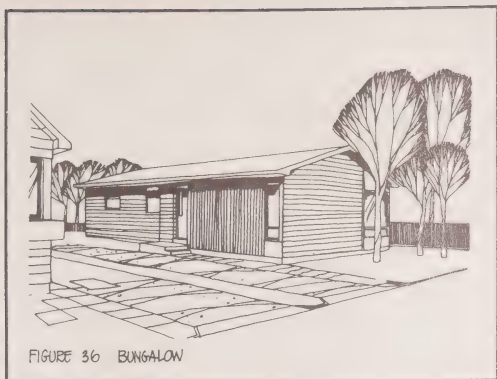
HOME TYPE	ST. CATHARINES ²	TORONTO ³	THUNDER BAY ⁴
Bungalow	\$ 90	\$120	\$166
Two storey house	115	151	214
Semi-detached	85	108	148
Row house	69	84	112

¹Assuming 1980 Energy Costs.

²Taken as Zone I Levels for purposes of this illustration.

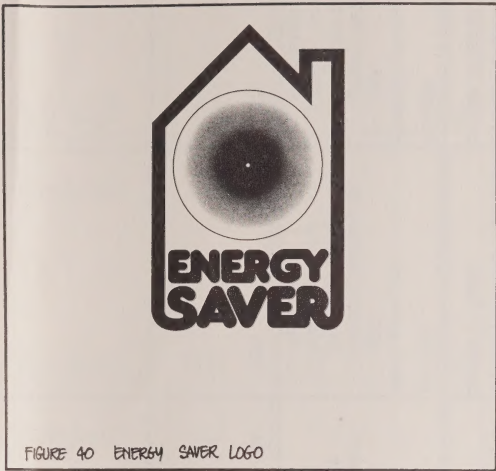
³Insulated to Zone II Levels.

⁴Insulated to Zone III Levels.



LOOK FOR 'ENERGY SAVER' HOMES

HUDAC has made available a Canada-wide program to enable builders to certify energy-efficient homes designed for climate conditions of the particular location. You will recognize homes built to these higher standards by the Energy Saver logo (see Figure 40). Lending agencies and mortgage insurers have promised to give preferential treatment to buyers of these homes – another way for you to save by being energy conscious. So, in addition to looking for the features in the guide, look for the Energy Saver logo, the seal of comfort, economy and value.



30

This checklist is a convenient way to write down the energy efficiency features of the homes you visit. There is space for four different homes. Check off the features that the homes do or do not have. These 14 features are the same ones discussed in the Guide; the relevant page numbers are referenced beside each one for your convenience. Refer to page 26 for suggestions on how to interpret the results of the checklist. Even if you don't use this checklist you should be familiar with the features below enough to make an energy-wise choice for your new home.

1. **Air/Vapour Barrier:** Does the home have proper selection and application of its air/vapour barrier?
 - 0.15 mm (6 mil) thickness, large sheets?
 - Lapped or taped joints, sealed around openings?See page 10

2. Adequate Levels of Insulation:

- Basement walls or slab foundation perimeter?
 - Floors over untreated spaces?
 - Exterior walls?
 - Ceilings and attic?
 - Is the attic insulation well-installed, i.e. no gaps, eaves left unobstructed, tightly sealed around ducts and pipes?
- See page 12

3. Floor Perimeter Insulation:

- Is it in place and well fitted?
See page 15

4. **Caulking and Weatherstripping:** does the home have

- Caulking around windows and door frames and in other gaps and joints around the outside of the home?

- Caulking at the joint between the sill plate and the top of the foundation wall?
 - Windows and doors weatherstripped so they fit tightly in their frames?
- See page 16

5. Storm Windows and Doors:

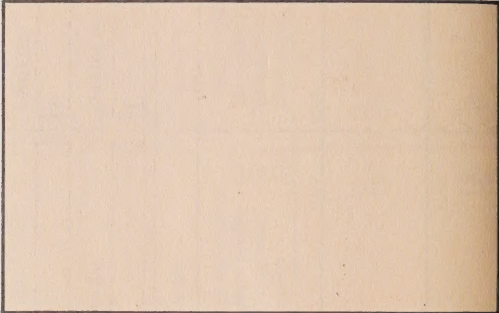
- Does the home have storm windows (two layers of glass with 12mm of space between) or even three layers of glass depending on climate?
 - Does the home have storm doors (or insulated doors)?
- See page 17

6. Space Heating Equipment:

- Has it been properly sized?
- If the home has a gas furnace, does it have spark ignition and automatic flue damper, or is it a condensing gas furnace?
- Or if electric baseboard heating is used, does it have individual wall unit thermostats?

7. Domestic Hot Water: <ul style="list-style-type: none"> Does the hot water tank have an insulated heat trap and 76mm of insulation? Does the home have flow restrictors in the showerheads? Do the hot water pipes have insulation even in heated spaces? See page 18	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Energy-Efficient Plan: <ul style="list-style-type: none"> Rooms with largest windows facing south and minimum area of windows facing north? Storage rooms and/or the garage shielding the northern side of the home? See page 19	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Lighting: <ul style="list-style-type: none"> Does the home use fluorescent lights in task areas such as the kitchen, bathrooms, and laundry area? See page 20	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Ducts and Pipes: <ul style="list-style-type: none"> Does the home have ducts taped at all joints and insulated if and where the ducts pass through unheated spaces? See page 21	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Fireplaces: <ul style="list-style-type: none"> Did the builder avoid including a fireplace? Or if he did install one, does it have airtight construction, dampened fresh air intake and heat exchanger? See page 21	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Energy-Efficient Appliances: <ul style="list-style-type: none"> If the home comes equipped with appliances do they have relatively low energy consumption ratings? See page 22	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Setback Thermostats: <ul style="list-style-type: none"> Does the home come equipped with a setback thermostat? See page 22	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Supplementary Energy Saving Features: <ul style="list-style-type: none"> Air-to-air heat exchanger? Thermal shutters? Air-to-air heat pump? See page 23	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total "Yes" items (Items 1-14)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Here is space to record information that a sales person may provide about energy costs of this or a similar home.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

COMPLIMENTS OF:



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